Space Weather Forecast

Issued on Monday, 20 May 2024 at 01:15 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate-class flares throughout. Chance of G1-G2 (Minor/Moderate) Storm conditions day 1 and 2 (20 and 21 May).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is at Moderate levels, with the largest flare a Moderate-class event at 19/1756 UTC from the moderately large region in the southeast. There are currently nine sunspots on the visible disc. The largest region lies in the southeast disc, with slight growth and consolidation in its intermediate spots and a moderately complex magnetic structure. The sunspot group located near centre-disc in the southern hemisphere remained largely unchanged, though also maintains a somewhat complex magnetic configuration. A region in the southwest indicated weak development, with some growth and consolidation of its intermediate spots. The other sunspot regions are generally smaller, simpler and more stable.

A large filament (arc of plasma) lift-off from the southern hemisphere that began around 18/2200UTC has been modelled as missing below Earth orbit. Another large filament eruption observed in the northwest is yet to be analysed for any potential Earth-directed component, but given its location, this is probably unlikely. Otherwise, no Earth-directed CMEs were observed in the past 24 hours.

Solar Wind / Geomagnetic Activity:
Solar winds were indicative of a near background regime, though perhaps with minor positive coronal hole influence. Solar wind speeds have ranged between 360-440km/s. The Interplanetary Magnetic Field (IMF) started the period at weak levels, but increased to moderate levels between 19/1000-1800 UTC, peaking at 10nT, before declining back to weak levels. The all-important north-south component was predominantly weakly negative, but briefly reached moderately negative values between 19/1100-1300 UTC. Geomagnetic activity was at Quiet to Unsettled levels (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained below the S1/Minor Radiation Storm levels on a slow decline, but above normal background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected with a chance of isolated Moderate-class flares and a very slight chance of isolated Strong flares. The moderately sized sunspot region in the southeast disc is most likely to be the source of significant flare activity.

Solar Wind / Geomagnetic Activity: There is the chance of a glancing blow from a CME at Earth late day 1 (20 May) or perhaps early day 2 (21 May), resulting from the M7.2 flare that occurred late on 17 May from the large sunspot region in the southeast. In the absence of any CME arrivals, solar winds are forecast to remain at or near background speeds throughout the

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period with no significant coronal hole enhancements expected.

Quiet to Unsettled conditions initially, before a possible glancing blow from a CME (which left the Sun on 17 May) arrives at Earth late day 1 (20 May) or early day 2 (21 May) with a chance of Active to G1-G2/Minor-Moderate (Kp5-6) intervals and a slight chance of G3/Strong (Kp7) interval should we see a more significant impact. Activity should then subside towards Quiet to Unsettled levels by days 3 and 4 (22-23 May).

Aurora Forecast: No significant enhancements to the auroral oval are expected until late day 1 or early day 2 (20-21 May), following the forecast potential arrival of a CME. Should the CME be detected at Earth, aurora may become visible (where skies are clear) across parts of Scotland and Northern Ireland, with a slight chance that views of the aurora may also be possible from northern England and North Wales. The chance of enhanced aurora activity is expected to decline again on subsequent nights.

Energetic Particles / Solar Radiation: Solar radiation is below the S1/Minor Storm threshold, on a slightly declining trend, but remains just above normal background levels following flare activity from the past week. There is a persistent slight chance of further enhancements should any large flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	50	50	5	1
Strong	G3	No	10	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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